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PATENT APPLICATION

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Title: Method and Apparatus for Reading and Writing
Information on a Stand Alone Magnetic Card
or Disk (Personal Computer Data Card)



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BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates to a method and apparatus for reading and writing information on a stand alone magnetic card or disk typically adapted for use in standard three and one-half inch computer floppy disk drives. In particular, the present invention is an improvement of the magnetic cards or disks disclosed in U.S. Patent No. 4,774,618 (Raviv), U.S. Patent No. 5,107,099 (Smith) and U.S. Patent No. 4,297,570 (Kowalski), the disclosure from each of which is expressly incorporated herein by reference in its entirety.

2. Discussion of Prior Art

Magnetic storage and retrieval systems using substantially circular rotatable magnetic disks are well known in the art and commonly used with modern personal computers. Such personal computers typically include floppy disk drives utilizing standard three and one-half inch floppy disks and/or five and one-quarter inch floppy disks. The standard three and one-half inch floppy disk is prevalent over the standard five and one-quarter inch floppy disk due to its smaller size and larger storage capacity. Both types of disks are typically housed in a rigid or semi-rigid outer shell functionally necessary to permit the floppy disk to rotate within the floppy disk drive of a computer and traverse read/write heads for data storage and retrieval.

Various types of storage media known in the art include magnetic strips or limited sections of magnetic media detachably affixed to cards of varying size and material.

1 Such cards typically include credit cards, passkeys, and paper or cardstock fare cards
2 with various devices available to read such cards. Specifically, Raviv (4,774,618)
3 discloses a business card containing a detachable magnetic strip for storing information
4 retrievable by a floppy disk drive of a personal computer. The magnetic strip may be
5 detached from the business card and placed in a carrier for insertion into a floppy disk
6 drive of a computer for information storage and retrieval. Alternatively, the entire
7 business card may be placed in the carrier and inserted into a floppy disk drive of a
8 computer for information storage and retrieval.

9 Smith (5,107,099) discloses a magnetic card reader where a credit card sized
10 memory card contains a plastic base and a magnetic layer capable of magnetic recording
11 and playback. An apparatus for reading and writing the credit card sized memory card
12 contains a rotatable disk with an opening for the card whereby the card is inserted in the
13 opening of the disk to be rotated with the disk to pass read/write heads for data
14 manipulation.

15 Kowalski (4,297,570) discloses a strip for magnetically receiving information
16 bonded to a paper substrate.

17 The prior art suffers from several disadvantages. Floppy disks typically have
18 cumbersome and limiting physical characteristics requiring specific size and dimensions
19 in order to be operable in the corresponding computer floppy disk drive. Further, a disk
20 or group of disks with a rigid or semi-rigid outer shell are cumbersome if carried in a
21 pocket or wallet, and have substantial weight thereby increasing the costs and burden of
22 delivering, shipping or mailing the disks. Paper or plastic cards with a fixed magnetic

1 medium have a storage capacity of a fraction of the capacity of a standard floppy disk
2 (three and one-half inch or five and one-quarter inch disks) since large quantities of
3 surface area of the paper or plastic cards do not contain fixed magnetic media and
4 therefore cannot be utilized for storage. Further, the cards are unable to rotate in a
5 standard three and one-half inch floppy disk drive, thereby impeding the potential of such
6 cards for use in standard computer floppy disk drives.

7 OBJECTS AND SUMMARY OF THE INVENTION

8 Accordingly, it is an object of the present invention to provide a new and improved
9 method and apparatus for storing and retrieving data from a standard three and one-half
10 inch floppy disk drive.

11 It is another object of the present invention to increase the storage capacity of
12 stand alone magnetic cards or disks while enabling the cards or disks to be compatible
13 with standard three and one-half inch floppy disk drives.

14 Yet another object of the present invention is to provide an adapter to enable stand
15 alone magnetic cards or disks to rotate within a standard three and one-half inch floppy
16 disk drive in order to traverse read/write heads for data storage and retrieval.

17 Still another object of the present invention is to enable stand alone magnetic cards
18 or disks to be of varying shapes capable of rotation within the standard three and one-half
19 inch floppy disk drive for information storage and retrieval.

1 Yet another object of the present invention is to provide a new and improved floppy
2 disk drive for direct insertion of a stand alone magnetic card or disk into the floppy disk
3 drive of a computer for information storage and retrieval.

4 A further object of the present invention is to provide a method of controlling the
5 read/write heads of a standard three and one-half inch floppy disk drive to accommodate
6 the varying rotational patterns of the differing shapes of stand alone magnetic cards or
7 disks.

8 The aforesaid objects are achieved individually and in combination, and it is not
9 intended that the present invention be construed as requiring two or more of the objects
10 to be combined unless expressly required by the claims attached hereto.

11 According to the present invention, a method and apparatus for reading and writing
12 information on a stand alone magnetic card or disk is accomplished by a stand alone
13 plastic or paper card or disk containing a magnetic medium. The card or disk includes
14 a magnetic medium on either one or both sides of the card or disk covering substantially
15 the entire surface area of the respective side. The card or disk is typically arranged in
16 varying layer configurations including the fundamental card or disk structure (typically a
17 paper or cardstock substrate, or a plastic or synthetic based material), one or more
18 magnetic medium layers substantially similar in size to the card or disk structure and
19 substantially covering the surface area of the card or disk structure, and one or more
20 bonded protective layers (typically thermoplastic, paper or paper/synthetic composite
21 material) to cover the magnetic medium. The cards or disks may be of varying shapes
22 including polygonal, elliptical or oval, circular, rounded as well as non-symmetrical
23 shapes. The card or disk is placed in an adapter either subsequently inserted into or

1 permanently disposed within a floppy disk drive wherein the card or disk is engaged
2 frictionally or mechanically by the adapter such that torque from the floppy disk drive is
3 transferred to the adapter causing the card or disk to rotate about an axis perpendicular
4 to the plane of the card and have the magnetic medium traverse read/write heads for
5 information storage and retrieval. In response to the initial positioning of the card within
6 the floppy disk drive of a computer, a code for a disk format pre-stored on the card or
7 disk is read and processed by the computer in order to determine the proper control for
8 the read/write heads during rotation of the card or disk based upon the shape of the card
9 or disk.

10 The above and still further objects, features and advantages of the present
11 invention will become apparent upon consideration of the following detailed description
12 of a specific embodiment thereof, particularly when taken in conjunction with the
13 accompanying drawings wherein like reference numerals in the various figures are utilized
14 to designate like components.

15 BRIEF DESCRIPTION OF THE DRAWINGS

16 Fig. 1A is a top view in plan of a stand alone magnetic card or disk suitable for use
17 in an adapter frictionally engaging the card or disk according to the present invention.

18 Fig. 1B is a top view in plan of a stand alone magnetic card or disk suitable for use
19 in an adapter mechanically engaging the card or disk according to the present invention.

20 Figs. 1C, 1D, 1E are top views in perspective of respective differently shaped stand
21 alone magnetic cards or disks according to the present invention.

1 Fig. 2 is a side view in elevation of a single-sided stand alone magnetic card or
2 disk according to the present invention.

3 Fig. 3 is a side view in elevation of a double sided stand alone magnetic card or
4 disk having two layers of a magnetic medium according to the present invention.

5 Fig. 4 is a view in perspective of an adapter mechanically engaging a stand alone
6 magnetic card or disk to enable operation in a floppy disk drive according to the present
7 invention.

8 Fig. 5 is a side view in elevation and partial section of a base of the adapter of Fig.
9 4.

10 Fig. 6 is a view in section of a ball bearing disposed at the end of a pin extending
11 from the adapter of Fig. 4 to improve rotation of the stand alone magnetic card or disk
12 according to the present invention.

13 Fig. 7A is a side view in elevation and partial section of a cover of an adapter
14 frictionally engaging a stand alone magnetic card or disk according to the present
15 invention.

16 Fig. 7B is a side view in elevation and partial section of a base of an adapter
17 frictionally engaging a stand alone magnetic card or disk according to the present
18 invention.

19 Fig. 7C is a top view in plan of the base of the adapter of Fig. 7B having a circular
20 plate beneath a friction gasket including a substantially centrally disposed pin according
21 to the present invention.

1 Fig. 8A is a top view in plan of an adapter mechanically engaging a stand alone
2 magnetic card or disk including a drawer for insertion and removal of the card or disk into
3 and out of the adapter according to the present invention.

4 Fig. 8B is a side view in elevation and partial section of the adapter of Fig. 8A.

5 Fig. 8C is a side view in elevation of the drawer opening in the adapter of Fig. 8A.

6 Fig. 8D is a side view in elevation and partial section of a stand alone magnetic
7 card or disk inserted within the adapter of Fig. 8A.

8 Fig. 9 is a procedural flow chart for controlling the read/write heads of a floppy disk
9 drive based upon the shape of a stand alone magnetic card or disk according to the
10 present invention.

11 DESCRIPTION OF THE PREFERRED EMBODIMENTS

12 Figs. 1A, 1B, 1C, 1D, 1E, and 2 illustrate respective exemplar embodiments of the
13 personal computer data card or disk of the present invention. Specifically, a single-sided
14 stand alone magnetic card or disk 23 includes either single opening 17 disposed
15 substantially at the center of card or disk 23 or dual openings 17 equally spaced from the
16 center of card or disk 23 a short distance approximately equal to 0.2 inches, and
17 magnetic medium layer 2 (typically high density and compatible with the standard three
18 and one half inch floppy disk drive) disposed between a protective layer 3 (typically
19 thermoplastic, paper or paper/synthetic composite) and a paper, cardstock or plastic
20 substrate 1. A protective layer 3 of thermoplastic is typically affixed to magnetic medium
21 layer 2 by use of high heat and pressure while a protective layer 3 of paper or a

1 paper/synthetic composite is typically affixed to magnetic medium layer 2 by use of heat
2 and a thermoplastic bonding agent. Magnetic medium layer 2 is substantially similar in
3 size and covers substantially all of the surface area of an adjacent surface of paper,
4 cardstock or plastic substrate 1 with an approximate storage capacity of 0.75 megabytes.
5 Data stored on magnetic medium layer 2 is typically encoded through magnetization and
6 arrangement of magnetizable molecules wherein a protective layer 3 of sufficiently thin
7 neutral material (i.e. plastic, paper or plastic paper hybrid) does not interfere with such
8 encoding or subsequent decoding of the data. Moreover, a protective layer 3 including
9 paper is advantageous as text and/or graphics may be placed on the paper to thereby
10 utilize card or disk 23 simultaneously as both a data storage device and a business card
11 or other type of advertisement media. Single or dual openings 17 enable card or disk 23
12 to be aligned and rotated within an adapter either subsequently inserted into or
13 permanently disposed within a standard floppy disk drive in order to traverse read/write
14 heads of the floppy disk drive for manipulation of the information stored on the magnetic
15 medium as described below. Further, card or disk 23 may be of any shape (Figs. 1C, 1D,
16 1E) allowing for rotation of card or disk 23 in substantially the same area as required for
17 disks compatible with the standard three and one-half inch floppy disk drive. Varying
18 shapes of card or disk 23 may include polygonal, elliptical or oval, circular, rounded as
19 well as non-symmetrical shapes.

20 A double sided stand alone magnetic card or disk substantially similar to the single
21 sided stand alone magnetic card or disk configurations described above but providing for
22 greater storage capacity is illustrated in Fig. 3. Specifically, paper or plastic substrate 1

1 is disposed between two layers of magnetic medium 2 typically of high density and
2 compatible with the standard three and one half inch floppy disk drive. The two layers
3 of magnetic medium 2 in combination enable card or disk 23 to have a storage capacity
4 of approximately 1.44 megabytes and be substantially similar to the storage capacity of
5 the standard three and one-half inch floppy disk. Each layer of magnetic medium 2 is
6 substantially similar in size and covers substantially all of the surface area of the
7 respective adjacent surface of plastic or paper substrate 1. Further, each layer of
8 magnetic medium 2 is adjacent a protective layer 3 typically including paper,
9 thermoplastic or a paper/synthetic composite. Protective layer 3 may be bonded to each
10 layer of magnetic medium 2 by high temperature and pressure. The double sided stand
11 alone magnetic card or disk 23 may utilize paper as protective layer 3 and therefore
12 provide for text and/or graphics on respective opposite sides of card or disk 23 to
13 simultaneously function as both a data storage device and a business card or other
14 advertisement media.

15 In order to retrieve or store information, the stand alone magnetic card or disk is
16 typically placed in an adapter mechanically engaging the stand alone magnetic card or
17 disk for insertion into the standard three and one half inch floppy disk drive as illustrated
18 in Figs. 4 - 6. Specifically, adapter 30 enables card or disk 23 to rotate freely within
19 adapter 30 subsequent to insertion into a three and one half inch floppy disk drive thereby
20 enabling read/write heads of the floppy disk drive to retrieve data from and store data on
21 magnetic medium 2 of card or disk 23 (Figs. 2 - 3). Adapter 30 typically includes outer
22 shell 5 substantially similar in dimension to a standard three and one-half inch floppy disk,

1 and torque transfer device 9 for transferring the rotary motion of the floppy disk drive to
2 adapter 30 for rotation of card or disk 23. Outer shell 5 typically includes cover 5a and
3 base 5b substantially similar in size, preferably rectangular, and typically made of plastic
4 or metal. Cover 5a and base 5b are pivotably attached to each other along respective
5 adjacent edges by hinge 8 such that cover 5a and base 5b are selectively pivotable to
6 an open or closed position to facilitate insertion and removal of card or disk 23 within
7 adapter 30. Adapter 30 is typically maintained in a closed position, for insertion into a
8 floppy disk drive, by lid clasp 28 substantially centrally disposed at the edge of cover 5a
9 opposite hinge 8. Cover 5a and base 5b are each partially cut away to define a
10 contoured corner 6 disposed adjacent hinge 8 to assure proper orientation of adapter 30
11 upon insertion into a floppy disk drive. Write protect lock 7 is mounted proximate a corner
12 of base 5b diagonally opposite contoured corner 6 and protects data stored on card or
13 disk 23 from being overwritten wherein a selectively slidable switch enables or disables
14 the protection. Write protect lock 7 is substantially similar to write protect devices on
15 standard three and one-half inch floppy disks.

16 A torque transfer device 9 is mounted in a circular mounting hole or opening 10
17 defined through base 5b substantially at the base center. The function of torque transfer
18 device 9 is to apply a rotary force from the floppy disk drive to adapter 30 for rotation of
19 card or disk 23. Specifically, torque transfer device 9 is substantially cylindrical in shape
20 and includes an interior circular end plate 11a and an exterior frusto-conical plate 11b
21 forming respective opposite ends of the torque transfer device. The diameters of interior
22 plate 11a and the larger surface of plate 11b are larger than the diameter of mounting

1 hole or opening 10 in base 5b to assure that torque transfer device 9 is retained in the
2 base. The axial length between facing surfaces of plates 11a and 11b is slightly greater
3 than the thickness of base 5b, and the diameter of torque transfer device 9 intermediate
4 the end plates is less than the diameter of mounting hole or opening 10, thereby assuring
5 that torque transfer device 9 and plates 11a, 11b are free to rotate relative to base 5b.
6 Exterior plate 11b has slots 12 defined in its exteriorly facing surface where the floppy
7 disk drive engages plate 11b to apply a driving rotary force causing torque transfer device
8 9 to rotate. Card or disk 23 is typically placed on the interior facing surface of interior
9 plate 11a and therefore rotates in conjunction with plate 11a. As card or disk 23 rotates,
10 read/write heads of the floppy disk drive may selectively access the magnetic medium
11 (typically high density) of card or disk 23 via a window 24, typically rectangular, defined
12 in cover 5a adjacent hinge 8 to expose the magnetic medium of card or disk 23. Base
13 5b may also contain a window 24 as described/above for an adapter accommodating a
14 double sided stand alone magnetic card or disk in order to expose both magnetic medium
15 layers (Fig. 3) of the double sided stand alone magnetic card or disk to read/write heads
16 of the floppy disk drive.

17 Interior circular plate 11a typically is provided with a gripping arrangement
18 permitting card 23 to be aligned with and secured to plate 11a, enabling the card to rotate
19 with torque transfer device 9. Specifically, torque transfer device 9 includes dual
20 retractable pins 14 equally spaced from the center of plate 11a by a short distance of
21 approximately 0.2 inches and extending from respective platforms 34 disposed between
22 plates 11a, 11b. Each platform 34 includes spring 15 extending from exterior plate 11b

1 to platform 34 in order to provide tension and resiliency for enabling pins 14 to retract.
2 Upon moving cover 5a and base 5b to a closed position, pins 14 contact spin plate 16
3 substantially centrally disposed in cover 5a. Spin plate 16 may be made of a durable
4 smooth material such as metal or hard plastic. Pins 14 typically slightly retract upon
5 contact with spin plate 16 causing tension from spring 15 to maintain pins 14 in constant
6 contact with spin plate 16. Pins 14 are typically disposed through openings 17 of card
7 or disk 23 (Fig. 1B) and upon moving cover 5a and base 5b to the closed position, card
8 or disk 23 is properly aligned and secured within adapter 30 such that in response to
9 insertion of adapter 30 into a floppy disk drive, card or disk 23 rotates in conjunction with
10 the application of the rotary force from the floppy disk drive as described above without
11 becoming detached from plate 11a.

12 In order to enhance rotation of card or disk 23, small bearing 18, typically a ball-
13 bearing, may be disposed in each pin 14. Specifically, each pin 14 includes an open
14 ended tip having a substantially circular opening with a diameter slightly smaller than the
15 diameter of the largest circular cross-section of bearing 18 such that bearing 18 is
16 partially retained within the open ended tip of pin 14. Spring 35 is disposed within pin 14
17 extending from platform 34 to bearing 18 in order to secure bearing 18 against the edges
18 of the substantially circular opening of the open ended tip of pin 14. Upon closing and
19 subsequent insertion of adapter 30 into a floppy disk drive, respective bearings 18 of pins
20 14 rotatably contact and circularly traverse spin plate 16 during rotation of card or disk
21 23 thereby reducing friction between pins 14 and spin plate 16 to provide for a smoother
22 rotational movement of card or disk 23.

Alternatively, Figs. 1A, 7A, 7B, 7C illustrate an adapter with a frictional engagement of a stand alone magnetic card or disk substantially similar to the adapter mechanically engaging the stand alone magnetic card or disk as described above. Specifically, card or disk 23 includes a single opening 17 substantially centrally disposed through card or disk 23 for use with adapter 30. Adapter 30 is substantially similar to the adapter mechanically engaging the stand alone magnetic card or disk (Fig. 4) and typically includes outer shell 5 and torque transfer device 9 as described above except that torque transfer device 9 has a single pin 21 disposed substantially at the center of plate 11a extending from platform 34. Torque transfer device 9 is disposed through circular mounting hole or opening 10 at substantially the center of base 5b in substantially the same manner as described above. Cover friction device 32 is mounted substantially similar to torque transfer device 9 in circular mounting hole or opening 33 defined through cover 5a substantially at the cover center. Cover friction device 32 is substantially cylindrical in shape and includes respective exterior and interior circular end plates 11c, 11d forming respective opposite ends of the cover friction device. The diameters of plates 11c, 11d are larger than the diameter of mounting hole or opening 33 in cover 5a to assure that cover friction device 32 is retained in the cover. The axial length between facing surfaces of plates 11c and 11d is slightly greater than the thickness of cover 5a, and the diameter of cover friction device 32 intermediate the end plates 11c, 11d is less than the diameter of mounting hole or opening 33, thereby assuring that cover friction device 32 and plates 11c, 11d are free to rotate relative to cover 5a. Cover friction device 32 further includes indentation 22 disposed substantially at the center of cover

1 friction device 32 for reception of pin 21 when cover 5a and base 5b are moved to a
2 closed position as described below. Friction gaskets 20 are affixed to the interior facing
3 surface of respective interior circular plates 11a, 11d and are typically composed of a
4 tacky or gummy rubber material providing sufficient frictional force to prevent slippage
5 between plate 11a and card or disk 23 during rotation as described above.

6 Torque transfer device 9 includes retractable pin 21 disposed on platform 34
7 residing between end plates 11a, 11b with spring 15 extending from exterior plate 11b
8 to platform 34 in order to provide tension and resiliency to enable pin 21 to slightly retract
9 in substantially the same manner as pins 14 (Fig. 5) as described above. Card or disk
10 23 is typically placed on an interior facing surface of friction gasket 20 affixed to interior
11 plate 11a subsequent to moving cover 5a and base 5b to an open position with pin 21
12 disposed through opening 17 of card or disk 23 to align card or disk 23 during
13 subsequent rotation. Upon moving cover 5a and base 5b to a closed position, pin 21 is
14 received in indentation 22 and card or disk 23 is engaged by respective friction gaskets
15 20 of interior plates 11a, 11d to prevent card or disk 23 from slipping or becoming
16 detached from interior plate 11a during subsequent rotation. In response to insertion of
17 adapter 30 into a floppy disk drive, the floppy disk drive engages exterior plate 11b via
18 slots 12 to apply a driving rotary force to rotate torque transfer device 9 as described
19 above. The rotation of torque transfer device 9 causes card or disk 23 to rotate based
20 on friction gaskets 20 providing sufficient frictional force to transfer the driving rotary force
21 from interior plate 11a to card or disk 23. The driving rotary force is transferred from
22 torque transfer device 9 through card or disk 23 and friction gaskets 20 of respective

1 interior plates 11a, 11d to cover friction device 32 thereby causing torque transfer device
2 9, cover friction device 32, and card or disk 23 to rotate while pin 21 and friction gaskets
3 20 respectively align and synchronize the rotation of card or disk 23 with the rotation of
4 interior plate 11a. Card or disk 23 is subsequently rotated to traverse read/write heads
5 of the floppy disk drive for information storage and retrieval with access to the magnetic
6 medium of card or disk 23 via window 24 (Fig. 4) as described above.

7 Figs. 1B, 5, 8A, 8B, 8C, 8D illustrate an adapter substantially similar to the adapter
8 mechanically engaging a stand alone magnetic card or disk as described above but
9 implementing an alternative technique for inserting and removing the stand alone
10 magnetic card or disk into and out of the adapter. Specifically, adapter 30 is substantially
11 similar to the adapter mechanically engaging a stand alone magnetic card or disk (Fig.
12 4) but typically includes a hollow outer shell 5, preferably rectangular and typically made
13 of plastic or metal, having dimensions substantially similar to the standard three and one
14 half inch floppy disk and utilizing a sliding drawer 25 to insert and remove card or disk 23
15 (typically having dual openings 17) into and out of adapter 30. Outer shell 5 typically
16 includes exterior surfaces 5a, 5b separated by a slight axial distance substantially similar
17 to the thickness of a standard three and one-half inch floppy disk and is partially cut away
18 to define a contoured corner 6 for providing proper orientation of adapter 30 upon
19 insertion into a floppy disk drive. Write protect lock 7 protects data on card or disk 23
20 from being overwritten as described above and is disposed on exterior surface 5a
21 proximate a corner diagonally opposite contoured corner 6. Drawer 25 is typically
22 rectangular in shape with dimensions slightly smaller than outer shell 5 such that

1 substantially all of drawer 25 fits inside outer shell 5. Drawer 25 is inserted into and
2 removed from adapter 30 via opening 31 typically disposed between exterior surfaces 5a,
3 5b and adjacent write protect lock 7. Drawer 25 and exterior surface 5a each contain a
4 window 24, typically rectangular, disposed toward the side opposite opening 31 and
5 adjacent contoured corner 6 to enable read/write heads of a floppy disk drive to access
6 the magnetic medium on card or disk 23 as described above. Exterior surface 5b may
7 also contain a window 24 as described above for an adapter accommodating a double
8 sided stand alone magnetic card or disk in order to expose both magnetic medium layers
9 (Fig. 3) of the double sided stand alone magnetic card or disk to read/write heads of the
10 floppy disk drive. Drawer 25 further includes spring lever 27 disposed adjacent window
11 24 toward the corner opposite contoured corner 6 for applying respective opposing and
12 coincident forces to drawer 25 in order to facilitate smooth lateral movement of drawer
13 25 into and out of adapter 30. Latch 28 is disposed on an edge of drawer 25 directly
14 across from window 24 to maintain drawer 25 within adapter 30. Torque transfer device
15 9 is substantially similar to, and is disposed in adapter 30 through mounting hole or
16 opening 10 disposed substantially at the center of exterior surface 5b in substantially the
17 same manner as, the adapter mechanically engaging a stand alone magnetic card or disk
18 (Fig. 4) as described above.

19 Card or disk 23 is typically placed on drawer 25 and laterally slid into adapter 30
20 for subsequent insertion into a floppy disk drive. During insertion of drawer 25 into
21 adapter 30, pins 14 typically retract in response to contact with drawer 25 thereby
22 enabling drawer 25 and card or disk 23 to be laterally slid, without interference by pins

14, into position over torque transfer device 9 with pins 14 maintaining constant contact with card or disk 23 via springs 15 as described above. Upon insertion of adapter 30 into a floppy disk drive, torque transfer device 9 engages a driving rotary force from the floppy disk drive to rotate itself and card or disk 23 as described above. Since the orientation of torque transfer device 9 is unknown during insertion of drawer 25 and card or disk 23 into adapter 30, pins 14 may not be initially disposed through dual openings 17 in card or disk 23 when drawer 25 and card or disk 23 are positioned over torque transfer device 9. However, as torque transfer device 9 initially rotates, pins 14 circularly traverse the approximate center area of card or disk 23 and dual openings 17. Upon traversal of dual openings 17 by pins 14, springs 15 force pins 14 through dual openings 17 thereby securing and aligning card or disk 23 to torque transfer device 9 for subsequent rotation as described above. In response to a withdrawal force applied to drawer 25 subsequent to the removal of adapter 30 from the floppy disk drive, pins 14 retract from dual openings 17 in order to enable drawer 25 to be laterally slid out of adapter 30 without interference by pins 14.

The aforementioned adapters or specific components of the adapters may be permanently disposed within a floppy disk drive to create a new and improved floppy disk drive. The new floppy disk drive enables direct insertion of the stand alone magnetic card or disk into the floppy disk drive of a computer for information storage and retrieval. For example, the adapter implementing a sliding drawer (Fig. 8A) may be permanently disposed in a floppy disk drive of a computer such that the drawer is maneuverable into and out of the floppy disk drive. The stand alone magnetic card or disk is placed on the

1 drawer and slid into and out of the floppy disk drive for information storage and retrieval
2 in substantially the same manner as described above. Further, the aforementioned
3 adapters or specific components of the adapters may be permanently disposed in the
4 floppy disk drive in any manner to effectuate direct insertion of the stand alone magnetic
5 card or disk into the floppy disk drive. The floppy disk drive and permanently disposed
6 adapter implement information storage and retrieval in substantially the same manner as
7 described above for the respective adapters.

8 Since the stand alone magnetic card or disk may include varying shapes,
9 read/write heads of the standard three and one half inch floppy disk drive require special
10 control as the varying card or disk shapes typically produce odd tracking patterns when
11 rotated in an adapter either subsequently inserted into or permanently disposed within a
12 floppy disk drive as described above. Figs. 1C, 1D, 1E, 9 illustrate a procedure for
13 controlling the read/write heads by a computer based on pre-stored information residing
14 on the stand alone magnetic card or disk. Specifically, card or disk 23 is typically
15 formatted according to its shape and such formatting and subsequent address locations
16 are predetermined and recognized by the computer via software. Initially, control software
17 for the read/write heads is loaded into memory (typically RAM). The computer, via the
18 control software, examines a disk residing in the three and one-half inch floppy disk drive
19 (typically drive A or B depending upon the particular configuration of the computer) by
20 rotating the drive mechanism of the floppy disk drive to scan the disk for a code indicating
21 that the inserted disk is a personal computer data card or disk (i.e., card or disk 23) of
22 a varying shape. If the special code is not present, a message is displayed indicating the

1 disk is not a personal computer data card or disk. If a special code is present, the disk
2 is a personal computer data card or disk (i.e., card or disk 23) and is subsequently
3 rotated to the next address where shape and format information for the personal
4 computer data card or disk resides. Based on the shape and format data, a specialized
5 individual software routine corresponding to the shape of the card or disk is accessed
6 from among a plurality of software routines where each software routine corresponds to
7 a particular shape of the card or disk. The accessed software routine controls, via
8 computer, rotation of the personal computer data card or disk and position of the
9 read/write heads to ensure proper tracking and addressing for information storage and
10 retrieval. Upon retrieving data from the personal computer data card or disk, the data is
11 examined to determine whether or not the data has been encoded. Encoded data
12 retrieved from the personal computer data card or disk is subsequently decoded and
13 loaded into the computer memory whereas non-encoded data is typically ignored with the
14 personal computer data card or disk being rotated to a succeeding address for
15 subsequent data retrieval.

16 It will be appreciated that the embodiments described above and illustrated in the
17 drawings represent only a few of the many ways of implementing the personal computer
18 data card or disk and corresponding adapter.

19 The shape of the personal computer data card or disk may be any shape capable
20 of rotation within dimensions of a standard three and one-half inch floppy disk, its
21 protective layer may be paper, paper/synthetic composite, thermoplastic or any other
22 material capable of protecting and allowing access to magnetic media, and its magnetic

1 medium may be any magnetic medium (high or low density) capable of being read or
2 written by floppy disk drives of computers. The personal computer data card or disk may
3 include a paper, plastic, cardstock or other suitably rigid or semi-rigid substrate.

4 The adapter hinge may be placed on any side of the outer shell to open the
5 adapter in any desired position, and may utilize any device or method capable of securing
6 and rotating the card or disk within the adapter when inserted into a floppy disk drive
7 including but not limited to additional openings in the card or disk, and securing the card
8 or disk about its perimeter within the adapter. The adapter may utilize any device or
9 material capable of supplying a resilient force to enable retraction of the pins, and may
10 include any type of bearing, roller or other device capable of improving rotation of cards
11 or disks within the adapter, and may further include any number of windows in varying
12 shapes capable of exposing the personal computer data card or disk to read/write heads
13 of a floppy disk drive.

14 The friction gaskets may include any tacky or gummy rubber material and any
15 other material capable of securing the card or disk within the adapter.

16 The drawer of the adapter may freely slide into the adapter from any side and in
17 any lateral direction with respect to the adapter. Further, the drawer may be secured
18 within the adapter from any side.

19 The control software may be implemented in any high or low level computer
20 language or by any hardware capable of controlling the read/write heads.

21 The personal computer data card or disk and adapter may be utilized in any
22 system having the standard three and one-half inch floppy drive. Further, the present

1 invention may be applied for use with various types of floppy or other disk drives in the
2 same manner as described above.

3 The adapters or specific components of the adapters may be permanently
4 disposed in a floppy disk drive of a computer in any manner capable of enabling direct
5 insertion of the personal computer data card or disk into the floppy disk drive for
6 information storage and retrieval.

7 From the foregoing description it will be appreciated that the invention makes
8 available a novel method and apparatus for reading and writing information on a stand
9 alone magnetic card or disk wherein a magnetic card or disk is inserted into an adapter
10 either subsequently inserted into or permanently disposed within a floppy disk drive of a
11 personal computer for information storage and retrieval.

12 Having described preferred embodiments of a new and improved method and
13 apparatus for reading and writing information on a stand alone magnetic card or disk, it
14 is believed that other modifications, variations and changes will be suggested to those
15 skilled in the art in view of the teachings set forth herein. It is therefore to be understood
16 that all such variations, modifications and changes are believed to fall within the scope
17 of the present invention as defined by the appended claims.